

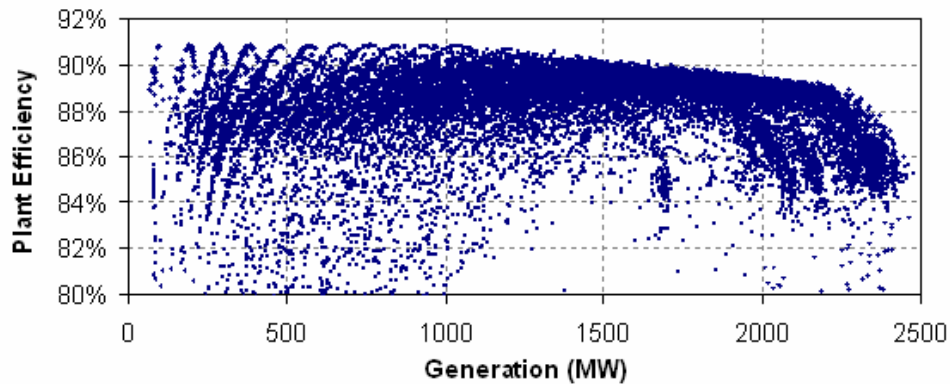
Purpose: Maximize energy production as electrical loads and requested water deliveries to irrigation change at small and medium sized hydro plants. The method is in an Excel spreadsheet.

Background: Energy production depends on how a hydroelectric plant is used during normal operations. The attached graph shows an analysis of actual plant operations over a period of one year. Each plotted point is the average efficiency during one hour. It can be seen that there is considerable scope for improving the operation of this plant.

There are two observations to make from this chart. First, it can be seen that when the plant output is lower and fewer units are used the efficiency follows a cyclical pattern, near the left end of the chart. In this region it would be desirable to load the plant only at the peaks of the individual curves – these are the best “base points”. The portion of the grid load carried by this plant should consider how to stay on the top of these curves.

Further to the right there are so many units in operation that there are no individual loading points that stand out as being better than others.

The second observation is the wide range of scatter below the envelope of highest efficiency. This cloud of points suggests that the generating units within the plant were often used in inefficient combinations. The operators should have dispatched and loaded the units more carefully to keep the plant efficiency as high as possible for the desired megawatt output. Optimal dispatching and loading of the units is the subject of this proposal



Method: The method is suited to applications at small and medium sized hydroelectric plants with two or more units. The spreadsheet format provides data management and flexibility for users to customize how to display tabular and graphical information. The units may be similar, or of different types. Two types of objectives are considered in the software:

1. Respond to changes in total plant load,
2. Respond to total flow required to pass through the plant.

The June 30, 2006 release of HUDOS is a Beta version that will be revised in response to comments from users. Please contact us to provide suggestions for improvements.